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Limitations Of Artificial Intellegence

By

SAHAR SULTAN

**A Graduate Paper/Capstone Submitted in Partial Fulfilment of the Requirements for the
Degree of Master of Engineering in Engineering Management**

Department of Industrial & Mechanical Engineering

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ABSTRACT

Artificial Intelligence is a groundbreaking technology that is now an established field. It is being used to mimic human capabilities such as speaking, listening, learning, and planning by using different algorithms to process data and produce results depending on the information provided by the user. Artificial Intelligence has been used in several industries when it comes to data processing and decision making. Artificial Intelligence has been invented to help decision and solution-making processes using a problem-solving approach. The development of Artificial Intelligence software provides efficiency and acceleration on different kinds of workflows, which will help organizations increase their profit and reduce wastage and costs due to poor productivity.

There are already many applications that Artificial Intelligence powers; some of these are Web Search, Cybersecurity, and Machine Translations. All people are now having the benefit of using Artificial Intelligence, and it is beneficial for humanity. Artificial Intelligence has many positive aspects as it produces substantial results in people's daily lives and businesses today; some of the most common Artificial Intelligence technologies used by the industry are robots and Virtual Assistants. Artificial Intelligence are powered by Natural Language Processing (NLP) and Speech Recognition Platform (SRP), but it is not limited to these two (2); many factors need to be considered, but these branches help in interpretation and manipulation of the commands stipulated.

Indeed, Artificial Intelligence is rapidly advancing, and many organizations are willing to try and test out what is available in the market. However, others are not convinced with the Artificial Intelligence as there are alleged ethical issues that might cause accountability in a particular manner. This thesis will explain how Artificial Intelligence is used in different fields like Law, Medicine, the Military, and others while discussing the limitations present.

OVERVIEW

Background of the Study

In the 1950s, computers were first developed, but at that time, the capability of computers is not measured. Due to the funding of the US Department of Defense, more research for AI has been done, but by 1974, the funding stopped that caused the slow progress of the which they called "AI Winter", Staff, N. (1999). In the 1980s, the research continued, and Expert Systems successfully researched how human knowledge and skills would be applied in AI. During the 1990s, the research continued concerning Logistics and Data Mining, and because of this, AI's development opened in other fields as well, such as Economics and Mathematics.

People only started to get worried about the technology when IBM developed Deep Blue in 1997. This chess computer defeated the Chess World Champion, GM Garry Kasparov. It gave people a realization that Artificial Intelligence can rule the face of the Earth as this kind of event did not end there. A Quiz Exhibition match in 2011 was conducted, and an IBM system called Watson did the same thing as what Deep Blue did, but this time, Watson has beaten two (2) champions (Harvard Business Review, 2003).

AI was not developed to replace humans, but to help in the daily lives, but people get caught up with the rapid success of AI that they assume the worst and disregard the milestones that the AI industry has come up with these past few years. According to Brynjolfsson, AI plays a vital role in putting value in the market industry as it is a cutting-edge innovation that will be very useful in the future.

It was explained by Pegasystems that there are two (2) categories of AI, and these are Opaque and Transparent. Opaque AI is a technology where there is no explanation of its results. It is still effective but has more risk factors. At the same time, Transparent AI is a technology wherein everything is calculated before producing results, and explanations are readily available as data are used to make a decision. The technical side of AI is based on science and algorithms, and most people who are not familiar with these have difficulty comprehending AI's operation. It is a fundamental aspect of human development that it is easier to overlook things that are not understandable or recognizable, and since AI is associated with substantial technical aspects, users struggle to understand the fundamental concept.

There is much skepticism on what intelligence is, how it functions, and how it develops as intelligence has different hypothesis, but the inventions and creations of human evolve as a human does. Artificial Intelligence is planned initially to replicate human intelligence and is seen by many to eliminate human error and boost jobs, and so far, AI has reached more possibilities than a human can imagine. Innovation in AI is rapidly increasing in that it communicates and calculates information faster than an average human brain (Attaran, M., & Deb, P., 2018). With this, people are now threatened that computers can replace people, thus will result in unemployment. AI is nowhere near perfection, but many uses for it that it is already starting to replace employees.

Some see AI as a game-changer in the business industry, while others see it as a technology that jeopardizes humanity's very survival. AI has a substantial effect on people's daily lives and will likely take on certain significant daily activities in the immediate future. The way technology is developing directly impacts the way of life, but with AI in question, there will always be drawbacks and difficulties.

The concept of robots acting like humans started to occupy scientists' minds, and the mathematician Alan Turing proposed the notion of machines possessing the power to reason and learn on their own. Alan Turing was able to test whether "machines can learn" by putting his theories and questions into effect. Following a series of tests (Turing Test), it was discovered that it is possible to allow machines to think and learn in the same way as humans (Arel, I., & Livingston, S., 2009). Turing Test takes a holistic approach to determine whether computers will act in the same way as humans.

There was a prediction that in the year 2020 that about 85% of all customer interactions could be made without any human assistance (Gartner, 2011). It does not necessarily mean that there will be no face-to-face interaction, but people's daily lives depend on Artificial Intelligence. This prediction is almost accurate as people now are using technology like Siri and Alexa in giving commands or simply by asking for information.

It is fascinating what AI can do, but an AI can do not all tasks. It is just more of a tool wherein it helps to increase human productivity. AI should be used as a tool to maximize the efficiency of a human's time and performance.

Theoretical Framework

AI capabilities is a preceding discussion as development keeps ongoing. Based on There are four (4) ways how AI produces value, and those are Automation, Decision, Marketing, and Innovation (Mikalef et. al, 2019). Because of AI, humans can now perform more tasks that require other skills that AI is still not capable of. There is a massive difference in the industry because of AI, but not all industries believe in AI as there are many limitations within. AI is still limited in making analogies or ingenuity creativeness as it works from all the data input and gathers by humans, which means AI is excellent in following the encoded algorithms but still not possible in creating its output.

Machine Learning (ML) is the most vital technology for AI to work. However, it will not function alone. Optical Character Reader (OCR) is one example of a technology included in the algorithm to make AI work. Natural Language Processing (NLP) is often needed for the interpretation and manipulation of language. Lastly, for configuration of tasks, Robotic Process Automation (RPA) is used. As much it is much more developed than before, these are still the technology needed, and it will not stop from here as development means much more technologies to be used. Also, most applications that AI runs are still narrow, like Image Recognition. This application does its job but not in the sense that the program will identify all images available.



Figure 1: Charles, an Emotional Robot from Cambridge University's Department of Computer Science and Technology

Another critical limitation that AI has now is Emotional Intelligence (Bellapu, A.,2021). NLP is the key to understand the meaning of human conversations, but communication is still different compared to humans as feelings and emotions are unique profiles, but things will change in the future as there is already a robot that knows how to recognize facial expressions.

AI requires supervision as it runs through an algorithm, but someone needs to create these algorithms, and this must be managed. The best example of unmanaged AI is a chatbot named Tay released by Microsoft (Liu, Y., 2017). This chatbot was supposed to have a casual conversation by engaging with people. Unfortunately, Tay was shut down not long after releasing due to unforeseen circumstances as Tay is an AI that runs through data feed to it, which caused it to tweet immoral messages.



Figure 2: Post from Tay, the Chatbot Twitter's Account

Due to these circumstances, it is proven that AI only knows what it is programmed to do. These researches are made to make AI like human beings, but the big difference is there will be no emotion and empathy to users. Thus, AI is not capable of having second judgments in different circumstances.

There are significant advances in Artificial Intelligence, yet the versatility of the human mind is far more complex, which is why even after years of development, researchers are still not able to mimic how the mind works. AI and the human mind remain unmatched, but there are already many robots or AIs that are doing all the work for humans, but it still does not change the fact that AI still needs humans to function. It might be much help in different industries such as Manufacturing, Medicine, the Military, and other services, but limitations on AI are still present, and there will always be limitations for the years to come. The question is, how far human can go to solve these limitations?

Technology Development

Numerous technologies, including artificial intelligence, have advanced at a phenomenal rate over the last four decades (West, D., & Allen, J., 2018). Machines are displacing humans in a variety of

fields, including agriculture, construction, and management. The effect of these developments on contemporary culture cannot be overstated, and there are many concerns regarding their possible consequences. For example, as these innovations advance rapidly, practitioners like accountants are debating whether AI would render their careers obsolete. This assignment would examine how artificial intelligence systems are poised to revolutionize the accounting profession. In general, AI will not harm accounting because its practitioners have already welcomed emerging technology. Instead, it will improve the accuracy of accounting procedures and free up accounting professionals to concentrate on making practical decisions for their clients through expert systems.

Over the last few years, different industries have expressed concern that new technologies, such as blockchain and artificial intelligence, could fundamentally alter their careers. Since AI technology applies to various functions, it is expected to impact both small and large industries. Client standards are now being impacted by technology advancements, as clients also require tasks to be completed on schedule and with minimum errors. Many routine operations, such as data entry, are likely to be completely automated in the next few years. However, these industries should understand that technological advancement does not always imply work loss. Managers will play a critical part, as they can possess change management capabilities and ensure that their entire enterprise accepts and adapts to the technical developments brought on by AI.

AI will not negatively affect the existing industries because its practitioners have historically adopted emerging technology, but instead, it will improve the quality of practices and allow employees to concentrate on making practical decisions for their clients through expert systems (Rotman, D., 2013). Professionals have no reason to fear being displaced by technology since they have coexisted with it for decades. Another emerging problem is that while AI technology is supposed to increase efficiency, there is concern that it will eventually eliminate low-skilled employment. As a result, employees must train themselves on integrating technologies into their daily job practices to improve their productivity and success. AI will help them improve their analytical abilities, raising their market. As a result, everybody must stay current with new and evolving technologies.

LITERATURE REVIEW

Philosophical Introduction

Artificial Intelligence has influenced modern computer science and, more broadly, cognitive science. Scientists and Philosophers have been deeply involved in researching the foundations, complexity, and boundaries of AI since it presents many obstacles to commonly held conceptions of mind and cognition. The current work builds on previous efforts in this challenging field. Artificial Intelligence is a rapidly growing field that encompasses a diverse range of computer-simulated tasks (Acemoglu, D., & Restrepo, P.,2018).

Thus, this field is well-known for its investigation into neural processes using computers and their high-powered simulation practices dubbed "artificial intelligence." AI is a human creation where it can mimic human brains. Due to AI's popularity, a virtual universe of photographs, bits of intelligence, minds, and other exotic entities has been developed (Mitcham, C.,2009). Thus, philosophers should investigate the fundamental presuppositions of artificial intelligence and determine the program's limitations.

Computers and other devices cannot take human brains, which are physically designed to carry out complex reasoning functions. Additionally, robots lack the consciousness and imagination that human brains possess. The concept of machine consciousness is a derivative concept ascribed to mechanical devices that have been artificially created, such as robots. A human mind is a computer machine such that all its operations can be formally coded and that any function of the mind can be deductively derived from a given set of inputs. It gives the impression that the human mind is syntactically ordered and that algorithms and inference rules can trace its operations. This theory has been recently stoutly debunked by many great philosophers of mind, including John Searle, Hilary Putnam, Roger Penrose, and many others. (R. Nath, 2019).

The object of research in AI is to discover what it can and cannot do even with the programs encoded to AI to function like a human. It is a known fact that AI research contributes to the improvement of beneficial computers and a better understanding of human cognitive processes

(Ullman, S.,2019). This research is about to span the full range of interests from classical problems in the industry through the issues of limitation of AI.

Artificial intelligence's primary goal is to replicate the mindset in robots (Analytics Insight, 2020). Any artificial intelligence researchers have attempted to demonstrate that a human mind is a machine. They also proposed that computers that think and behave similarly to humans are devices that think and act objectively. The technological model of the mind's fundamental tenet is that a brain is merely a digital machine and that the reason is a software program. The functionalist software has been heavily influenced by analogies taken from strong AI and computer science in general, both in terms of its overarching philosophy and some of its specific applications to questions concerning the essence of mind.

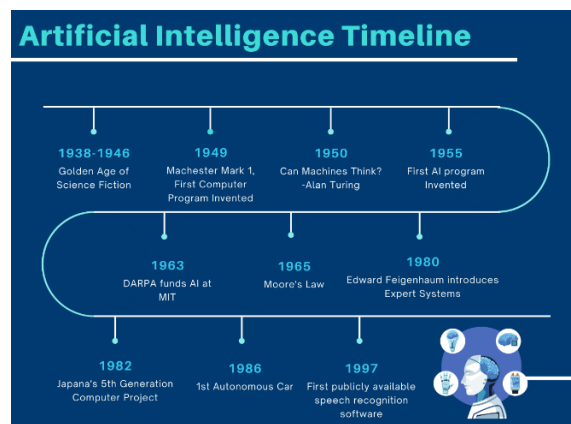


Figure 3: Artificial Intelligence Timeline

Technical Aspect

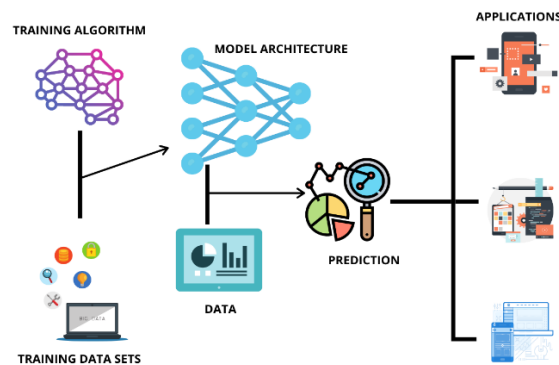


Diagram 1. Process of Artificial Intelligence

Robotics which is a branch of Engineering is one of the areas closely related to AI. Although both areas are fundamentally distinct, overlaps occur as artificial intelligence is incorporated in robotics with the goal of improving their response to a complex, unpredictable, and competitive world (WIPO, Technology Trends 2019). Statistics is another closely related area. It is debatable if machine learning can be considered a form of statistics.

Indeed, the objectives of both domains are not identical: while statistics is concerned with analyzing distributions or correlations, artificial intelligence is concerned with acting intelligently or accurately forecasting the future. Nonetheless, the machine learning algorithm is highly dependent on mathematical techniques.

Machine learning is the most widely applied subfield of artificial intelligence at the moment. It is concerned with training a computer program to recognize trends in data and adapt that information to new data. Deep learning is one of the most sophisticated subfields of computer learning. It is essential to understand other emerging forms of artificial intelligence, such as evolutionary algorithms.

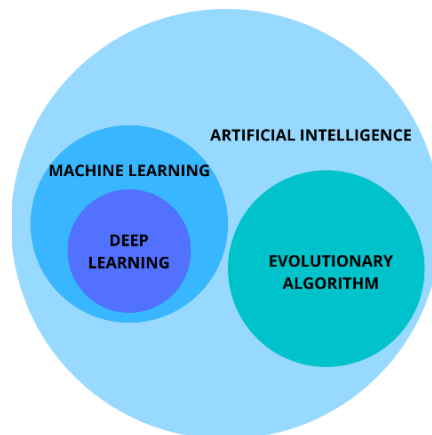


Diagram 2: Subfields of Artificial Intelligence: Machine Learning and Evolutionary Algorithms

ML is a general-purpose tool used in all industries to improve decision-making and foster creativity. Already in the 1980s, breakthroughs in statistical optimization techniques happened. Since then, advances in applying these approaches to machine learning have been. Machine learning's recent widespread adoption can be traced to two main factors: the availability of vast data sets suitable for testing and the rise in processing resources (J. Furman et. al, 2018).

The whole procedure is based on data processing using various algorithms. An algorithm is a series of sequential instructions. Generally, to make them machine-readable, algorithms are encoded as software. ML processes come in multiple flavors, based on the data they use and the job at hand. ML is a multi-stage process. First, a model architecture is programmed; secondly, a model is created through the training phase using a training algorithm and training data sets; and thirdly, the model is applied to new data to produce a particular output.

ML model is the process's primary production. It is a mathematical function-dependent algorithm that produces output based on the patterns learned in the training data. One example of a model is artificial neural networks, whose configuration and operation mimic the human brain. These models are based on an architecture typically defined before the training phase by a programmer and are composed of layers of neurons linked by weights. Each neuron is a mathematical feature that converts inputs to outputs. The model is made up of all the tasks carried out by the neurons.

In the sense of machine learning, two kinds of parameters can be distinguished: hyperparameters and trainable parameters. Trainable parameters change through the training period, while hyperparameters are pre-defined and do not change. They are random-assigned numeric values that are then optimized during the training phase.

A model can be found online or in person. The optimization method and the actual implementation are divided into the currently prevalent offline models. There is no adjustment of the weights during the implementation process. If the algorithm is constructed as an online model or dynamic model, the optimization never stops. Its performance is used to change the weights while it is being implemented continuously.

Training data is 'fed' into the model during the training phase. The training algorithm optimizes trainable parameters based on this. A training algorithm requires a loss function that quantifies the model's accuracy. A loss function is a mathematical expression that quantifies the magnitude of a model's error. As a result, the training algorithm would minimize the loss function by identifying the optimal set of trainable parameters. Thus, changing the weights is a mathematical process. As a result, an equivalent model will be built with identical parameters. Slightly altering the parameters results in the development of a somewhat different model but possibly capable of generating outputs of comparable precision.

In general, the essential component of the machine learning process is the training data. The more accurate the estimation of the trainable parameters and the more precise the results, the better the training data in terms of quantity, consistency, and variety. During the testing period, no training data is contained in the model, and after the training is complete, the model is entirely available regardless of the data. As a result, the creator of a model could commercialize it without disclosing the training data.

Human feedback is primarily used in machine learning to select or construct a training algorithm, set hyperparameters, mark data, and develop the model architecture (Brew, C.,2006). And when models tend to be 'intelligent,' they produce performance solely through probability calculations. They are not self-sufficient and need fine-tuning by machine learning experts.

In general, and machine learning in particular, artificial intelligence is sometimes referred to as a 'black box.' This field is undergoing research. In general, machine learning's explainability differs according to the model's difficulty and the training techniques used. The issue typically occurs where deep neural networks are used since humans, unlike computers, are incapable of handling such vast quantities of data. Machine learning's explainability and interpretability are a significant field of study at the moment.

An evolutionary algorithm is a type of optimization algorithm that seeks to find the optimal solution to a given problem from a set of several self-generated alternatives (Sloss, A., 2019). Evolutionary algorithms are based on Darwinian concepts since natural evolution has been an extremely effective optimization method. An evolutionary algorithm, unlike artificial neural networks, does not require training data to find a solution (Kohl, N., & Miikkulainen, R., 2009). Rather than that, a random population of potential solutions with varying characteristics is first created. Second, the evolutionary algorithm assesses each key's consistency and fitness and chooses the best match. The selected solutions are then changed through replication, mutation, and recombination. This procedure creates a new population that is tested once more. The process is repeated before the optimum solution is discovered. Machine learning may make use of evolutionary algorithms. However, their use extends beyond model development since they can be used for various other activities.

Behavioral and Ethical Aspect

Artificial intelligence is pervasive and unavoidable. Artificial intelligence today pervades almost every part of people's lives, from choosing which books or flights to purchase online to determine if work applications are successful, bank loan approvals, and even the kind of disease a person has (Martínez-Plumed, F., Gómez, E., & Hernández-Orallo, J., 2020). Many of these factors – and several others – are now increasingly calculated automatically by sophisticated computing programs. The tremendous advances that AI has taken in recent years are remarkable – and AI can improve life in various ways.

The growth of artificial intelligence has been unavoidable over the last couple of years. Numerous established technology firms – including industry titans such as Amazon, Facebook, and Microsoft – have established new testing laboratories (Makridakis, S., 2017). It is not an exaggeration to state that computing has become synonymous with artificial intelligence.

Some technologists have opinions in AI when it comes to Ethics. According to Peter Norvig, Google's director of science and a founder in machine learning, the data-driven AI technique that underpins much of the company's recent achievements, the critical problem is determining how to ensure that these emerging systems benefit society as a whole – not just those in charge (Nicastro, D., 2018).

The major issue is that the sophistication of the program often makes it difficult to deduce why an AI system behaves the way it does. With today's AI, which is based on the massively effective methodology known as machine learning, it is impossible to raise the lid and peer inside. The task then is to develop innovative methods for tracking and auditing the many fields in which AI currently plays a significant role (Martínez-Plumed, F., Gómez, E., & Hernández-Orallo, J., 2020)..

Some of the ethical issues confronting robots are similar to those facing many other aspects of computer design. However, as AI algorithms undertake cognitive tasks with social dimensions—functions that humans historically undertook—the AI algorithm inherits the social specifications (Bostrom, N., & Yudkowsky, E., 2011).

Transparency is not the only attractive characteristic of artificial intelligence. Additionally, it is critical for AI algorithms assuming social roles to be predictable to those they control. Find the following analogy to illustrate the value of such predictability. The moral concept requires judges of stare decisis to observe prior precedent wherever possible. Predictability is a critical feature of the judicial system.

Another critical social criterion for working with organizations is locating the individual responsible for completing a task. Modern bureaucrats also seek shelter in existing processes that thinly spread the risk that no single individual can be held accountable for the resulting disasters (Howard 1994).

Accountability, integrity, traceability, moral rectitude, repeatability, and avoiding to create frustrations are some social functions that are only applicable to humans. All of these should be considered in creating algorithms to be encoded on AI. These social functions are important in to avoid behavioral and ethical problems on the future creation on AI.

When it is considered that certain potential AI programs might be contenders for moral standing, a new series of ethical questions emerges. Dealings with moral creatures are not solely a matter of instrumental rationality: moral grounds exist for treating them in some respects and refraining from treating them in others.

It is commonly accepted that modern artificial intelligence applications lack morality (Luccioni, A., 2020). People have complete freedom to modify, copy, cancel, uninstall, or use computer programs, at least insofar as the programs themselves are concerned. AI was invented to help humans in their daily lives but moral values were unfortunately not considered during the creation. It is not a part of the algorithms used but it is already under study on how it will be associated and implemented on AI.

A few ethical concerns need to be addressed in AI to be more human-like thinking (Luccioni, A., 2020).. Though, making these would signify significant complications. To create these, clarity and prediction should be added to the existing algorithms used in AI.

One possible problem if this happens is would the law accept an invention like that. If an AI has an advanced mental ability with the right moral standing, it would already clarify as a human being. It would make the world think if Artificial Intelligence can replace humans in the near future.

Having an AI with ethical and moral values would be an advantage to some industries but would the law allow this to happen? And if they let it happen, how restricted would it be? Many questions are left unanswered but having this kind of technology will provide massive advancement for people.

Finally, the possibility of AIs with superhuman intellect and abilities places us in the unusual position to define an algorithm that produces ethical actions (Luccioni, A., 2020).. Although these problems seem visionary, they seem inevitable; they include several recommendations for current research directions.

Risks of Artificial Intelligence

Regarding the real threats posed by AI today, the one that seems to be causing the most fear is work destruction, which appears to be imminent in some sectors (Milićević, P.,2020). Employees that have AI supports have several benefits over their human counterparts. Since they lack personal and emotional responses, they are never exhausted, lonely, or overwhelmed, and more effective and successful. Additionally, their potential for error is greatly diminished.

Such characteristics of AI are more likely to result in cuts in industries since activities can be automated, such as trucking, food service, and distribution, resulting in millions of job losses and increased income inequality (Milićević, P.,2020).. Another growing issue is privacy infringement. This has already occurred in China, where AI-powered systems are being used for mass surveillance, wreaking havoc on the country's so-called social credit system.

The framework monitors users' activity across many platforms – it has access to their social media accounts, financial data, and health information. This data, which includes jaywalking and improper waste sorting, will have a detrimental effect on the credit score while giving blood or volunteering will improve it. Adverse credit will prevent people from purchasing plane tickets or enrolling their children in those colleges, for example.

Finally, the risk of using AI capabilities for strategic purposes can not be overlooked, as the prospect of such influence being consolidated in the hands of some of the world's leaders seems to pose a genuine danger to the world as we know it. When we consider the advantages and dangers

of artificial intelligence, let us not overlook one critical point: AI does not set its targets. The power it possesses is the power we assign to it to fulfill the tasks at hand, which means that we are accountable for all its gains and threats (Milićević, P.,2020).

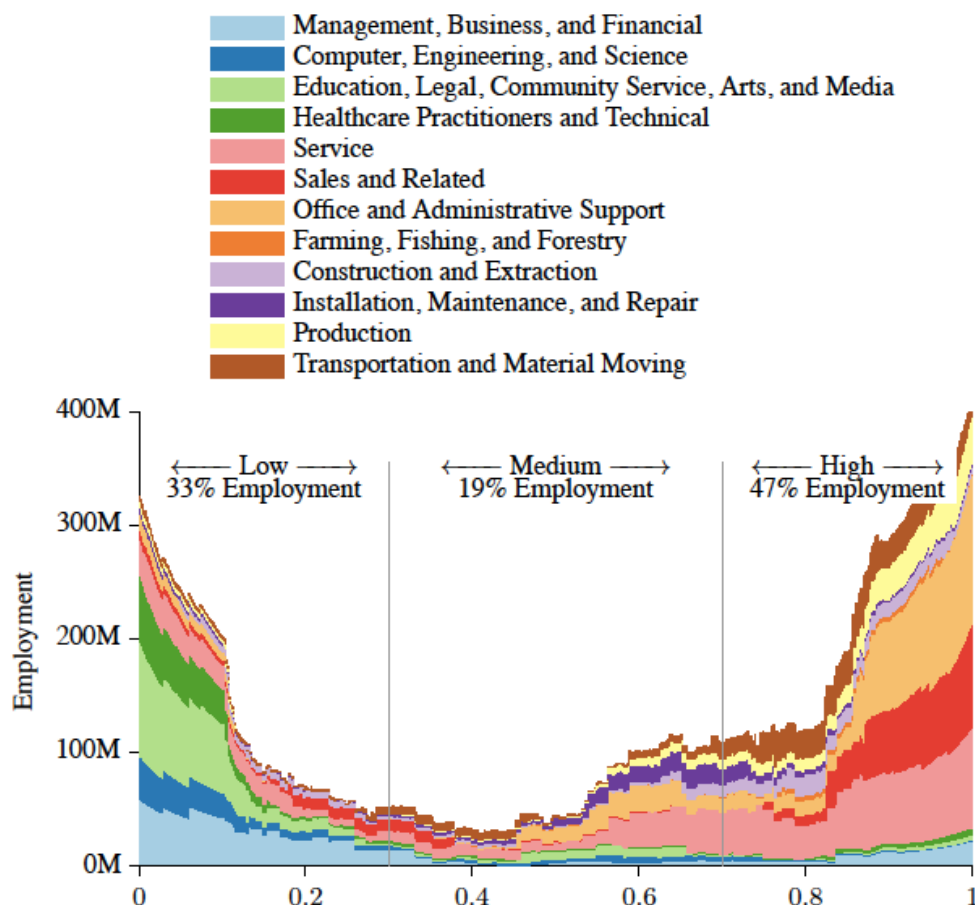


Chart 1: Probability of Computerization from “The Atlantic”

There was a prediction that the next phase of computer advancement would begin to erode human labor in areas where it has already done so: engineering, administrative service, banking, and transportation. (Frey, C., & Osborne, M., 2013). The majority of remaining industrial workers are expected to dwindle over the following decades. Similarly, cashiers, counter clerks, and telemarketers face risk. On the far right side of this table, you can see the breakdown of industries for the 47% of workers they deem at risk.

METHODOLOGY

Use of Artificial Intelligence in Different Industries

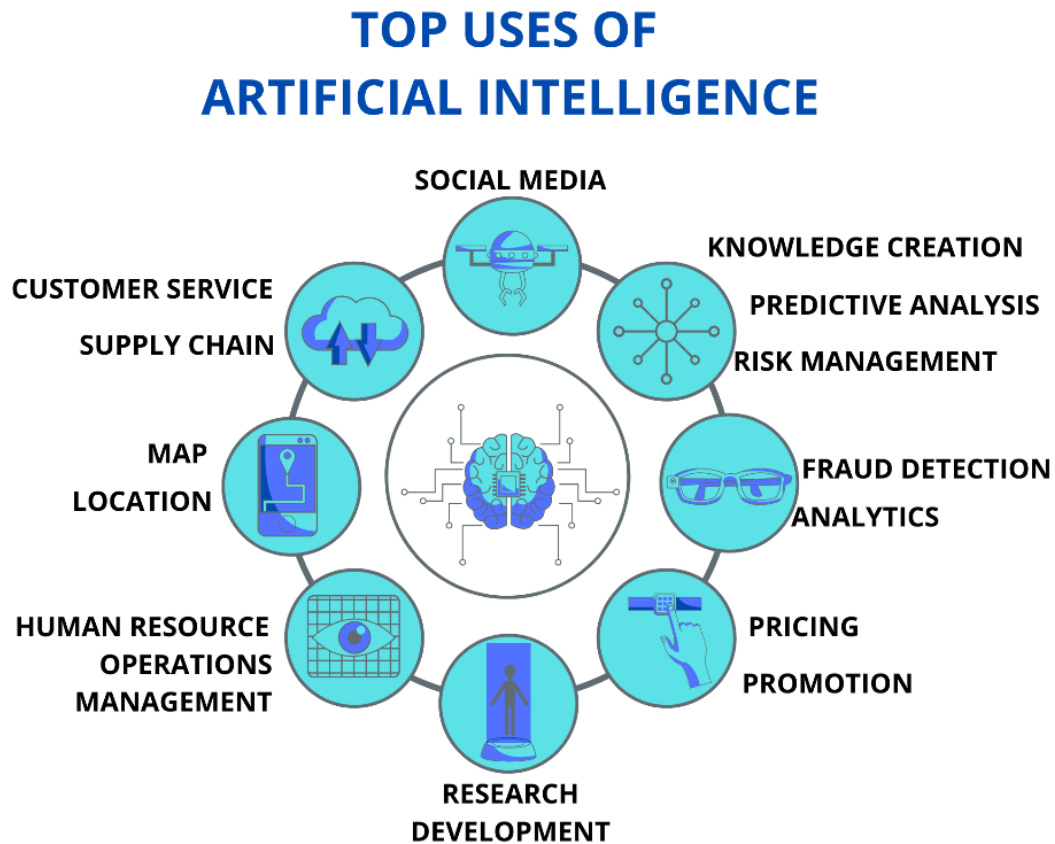


Figure 4: Uses of Artificial Intelligence

The world that people saw in films has now arrived. Numerous businesses are investing in artificial intelligence and big data technology in the modern era. Automated decision-making systems focused on data analysis reports are made possible by data analysis and artificial intelligence. Businesses in all industries are trying to simplify and automate their activities to increase income (Yeung, J., 2020). They need qualified practitioners, preferably those who have completed an AI course, to accomplish these objectives.

Artificial intelligence (AI) and machine learning have an increasingly growing impact in today's society, spanning a wide variety of industries. From curriculum to fashion, they will execute

various activities – from streamlining procedures to assisting managers in making more informed decisions. AI has the potential to alter how the modern world operates.

Financial Services

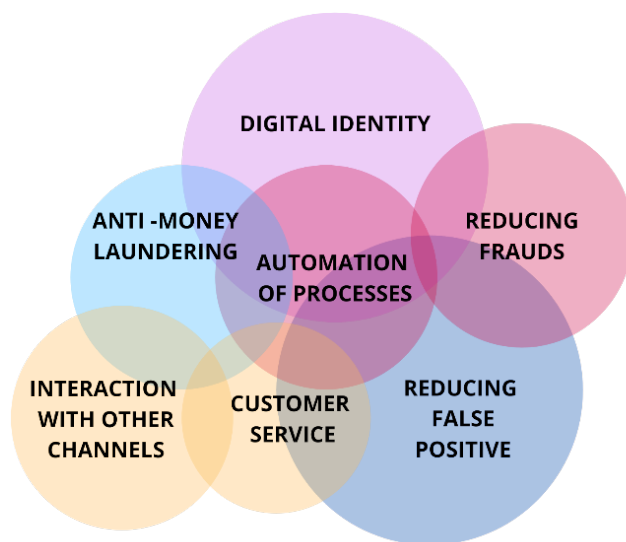


Diagram 3: Uses of AI in Banking

If internet transactions continue to increase in popularity, the finance and banking industries face a growing number of complicated identity theft and fraud loss cases. AI can significantly improve financial cybersecurity, as algorithms using deep learning technology can analyze trends and detect unusual activity and potential fraud.

PayPal, for example, reduced theft to 0.32 percent of sales by implementing a complex deep learning technology that analyzes transactions in real-time (Techno Vision, 2020). Trading and wealth management often use artificial intelligence, or more generally, machine learning—a subset of AI.

A machine learning (ML) algorithm is essentially a learning framework that automates developing mathematical models. Artificially intelligent hedge funds and Robo-advisory systems are on the rise due to emerging machine learning technology. Additionally, AI assists in routine financial reporting activities such as evaluating credit satisfaction and automating customer experiences.

When it comes to Financial Services, the importance of equal and ethical AI applications cannot be overstated. Financial services firms increasingly rely on AI to advise crucial decisions that may

harm their customers, such as loan and credit card denials. Therefore, it is critical that any judgments made by AI algorithms are not unjustly skewed against a particular demographic segment of their consumer base.

With the progression and implementation of AI expected to continue for the near future, questions about the broader ramifications of such a revolutionary technology have grown (Kaushal, M. et. al, 2015). AI tools do not become discriminatory on their own; instead, they pick up on inherent human and social prejudice woven into data sets, algorithmic configurations, and decision outcomes. Also, the largest technology companies have not been immune to innate bias filtering into their algorithmic tools.

Modern AI systems are driven by ML algorithms that forecast new data instances. The observed results of those forecasts are fed back into the learning process, which adapts to new data and improves over time. However, whether the data or outcome choices contain inherent bias, the learning process will intensify this bias.

Technology

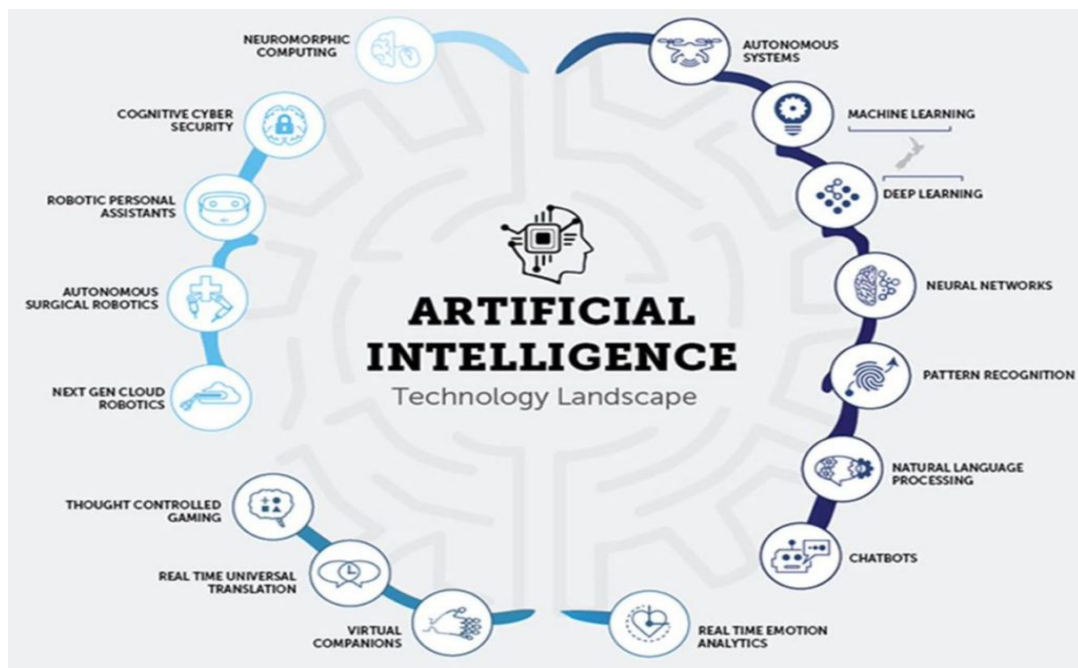


Diagram 4: Artificial Intelligence Landscape (Khalid H., 2017)

Technology firms do not only develop AI solutions; they even make use of them. Additionally, companies like Google and IBM are known to buy smaller AI firms to achieve a competitive edge. Since technology firms often have difficult items for ordinary laypeople to comprehend, chatbots and robotic customer assistants powered by speech recognition and natural language processing are invaluable for them.

SMEs normally use chatbot but companies like Apple and Google have already built their own intelligent voice assistants. They interpret human language and return relevant responses using neural networks. Additionally, AI-powered translation engines are a significant development since they can revolutionize the field of communication. Skype provides real-time artificial intelligence translations, and Google Translate utilizes a proprietary computer translation technology to deliver the most precise translation of any two languages. Face and image recognition systems are now extensively researched and used (Whittaker et al. 2018), especially by large social media platforms like Facebook. There are several AI implementations in the technology sector, and its popularity continues to grow.

Data privacy is one of the most ethical concerns surrounding the use of AI in technology. AI is known to store user data, often used for other purposes, such as the advertisements you encounter when surfing the internet. The digital realm has expanded significantly: both data processing and distribution are now digital, our lives are becoming increasingly digital, the majority of digital data is directly linked to a single Internet, and a growing amount of sensor technology is being used to produce data regarding non-digital facets of our lives (Müller, V. ,2021). AI expands all the opportunities for intelligent data gathering and research. It is true with both blanket monitoring of whole populations and traditional concentrated surveillance. Additionally, a substantial amount of data is shared between agents, usually for a price.

The ethical implications of artificial intelligence in surveillance extend beyond the gathering of data and the course of attention to the use of knowledge to control behavior, both online and offline, in a way that threatens autonomous rational choice. Though attempts to exploit behavior are not new, they can take on a new dimension when aided by AI systems. Due to users' frequent interactions with data structures and the resulting depth of information about people, they are susceptible to "nudges," coercion, and deceit. With many primary data, algorithms may be used to

approach individuals or small groups with precisely the type of feedback that these individuals are likely to respond to.

Education

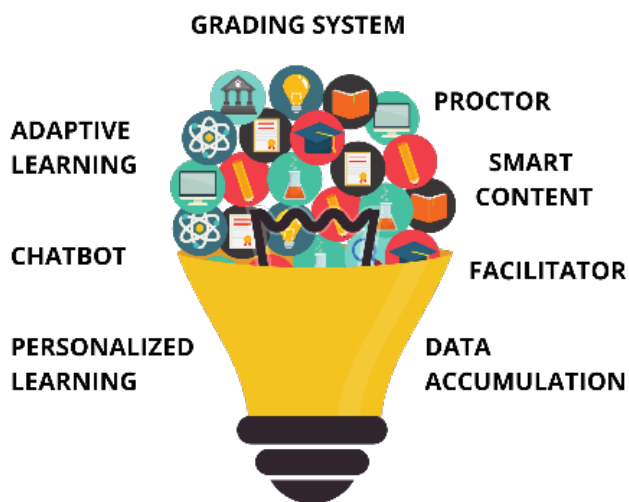


Figure 5: Uses of AI in Education

Educational institutions have been more receptive to the use of AI technologies. It is now being used in the classroom to assist with marking and to help students create more effective lesson plans. One of the most significant applications of artificial intelligence in education is through AI tutors. Although human tutors have historically been an integral part of the educational method, there are places where AI can help. For students who need the most assistance, technology may offer a customized learning environment. AI tutors can be used in-person or online, and they can interpret test results in real-time to modify the instructional experience of the pupil as he or she is studying. As this technology advances, it can support an increasing number of students.

These exponential technical advancements invariably introduce many uncertainties and threats that have outpaced public discussions and legislative structures. Training and learning are the relationships between AI and education. The objective is to lead to the mainstreaming of AI's human and technological facets into school-based training programs. It starts with a pilot program

to build curriculum creators and master trainers from selected national institutions to inspire youth (UNESCO).

AI enables a greater emphasis on the student's unique needs. Numerous major education networks, such as Carnegie Learning, invest in artificial intelligence to provide more customized lessons. Personal instructions, testing, and input are now available. As a result, students deal with content they are prepared for and fill in information gaps.

With the advancement of Artificial Intelligence, it might be possible to track and interpret students' facial expressions. If the content becomes too complex, the app will tailor the lesson to the user's needs. Without communicating with an instructor, voice assistants such as Google Home allow interaction with various learning materials. As a consequence, an education website can be accessed from anywhere and at any time.

Some Universities even use voice assistants such as Alexa to handle routine campus tasks. The assistant will answer often asked questions or keep track of the student's schedule. Additionally, learners find using such assistants fascinating and thrilling, which keeps them interested in the educational process (Ramos, D.,2018).

AI creates many platforms for information sharing on a global scale. Students may learn a variety of classes and educational systems using AI solutions. Additionally, AI opens doors for students who speak several languages or have vision or auditory impairments. For instance, Presentation Translator is an artificial intelligence-based solution that generates real-time subtitles. Students can hear and read in their native language using AI Speech Recognition.

Student assistance is another use for AI, which is gaining traction in higher education institutions. Schools use machine learning to direct students. Specific programs assist students in scheduling their course load automatically. Others prescribe classes, majors, and career paths—as guidance counselors or career services departments have historically done. These tools allow predictions based on the previous performance of students with identical data profiles. For example, if a student struggles with chemistry, the resources can guide them away from a pre-med major or offer data visualization as a career option for a graphic artist (Lynch, M., 2018).

Another way AI helps students is with financial assistance. Higher education institutions may use student data to make last-minute microloans or advances to students that need funding to complete

the semester to avoid dropping out (Lynch, M., 2018). Finally, one of the most prevalent applications of predictive analytics in student service is for early warning systems, which analyze a wide variety of data—academic, nonacademic, and operational—to detect students at risk of failing, dropping out, or experiencing mental health problems. This unique use demonstrates some of the actual benefits of AI — big data can provide educators with a more comprehensive view of their students' status. Historically, an organization could have relied on a few specific factors—for example, GPA or attendance—to determine if a student is at risk.

AI software programs can measure student risk in real-time, using even more detailed knowledge and student behavior patterns. Some integrate additional data, such as when a student ceases to visit the cafeteria for lunch. They can provide information about students' visits to the library or gym and their use of school facilities. While these programs will help streamline success, they also pose serious questions regarding student privacy and autonomy.

Finally, colleges and universities may incorporate artificial intelligence into their instructional processes. It entails developing applications that adapt to the speed and success of individual users. Educational software monitors students' success and advises or automatically provides relevant sections of a course for review or external tools to consult students (Lynch, M., 2018).

Medicine

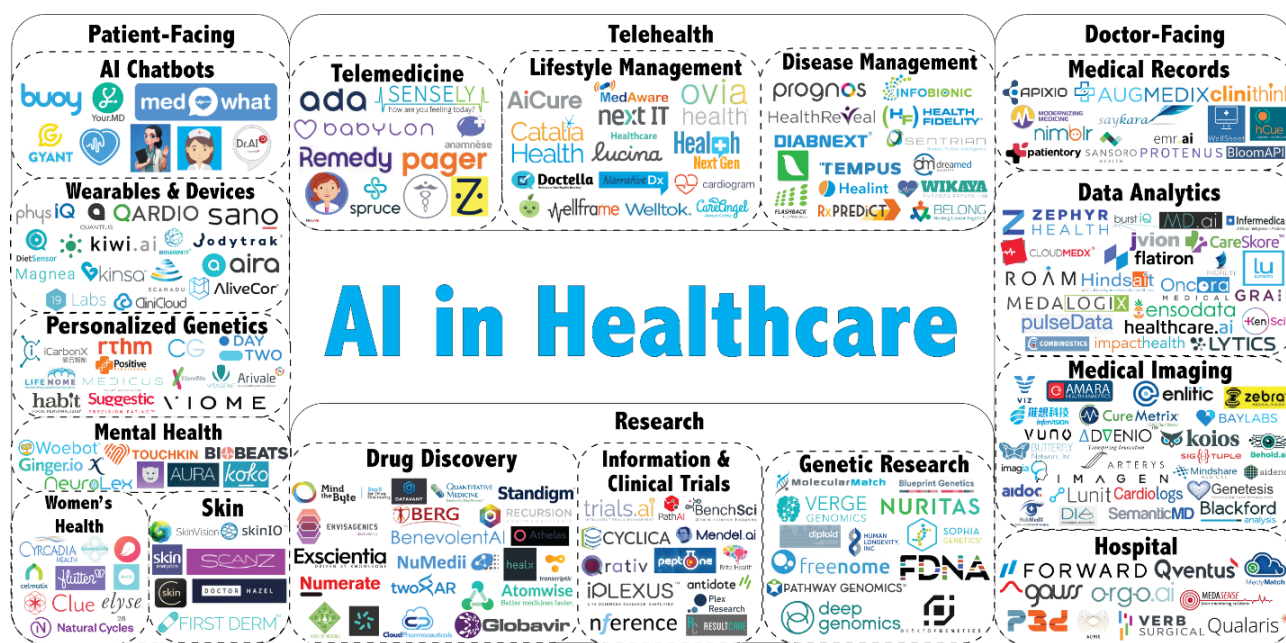


Figure 6: 211 Businesses who are Revolutionizing Healthcare through the use of Artificial Intelligence (Kou, E., 2017)

Health care is one of the industries with a plethora of examples of artificial intelligence, especially with the emergence of smart hospitals (Singh, J. 2019). One of the most prevalent applications of this technology is robot-assisted surgery. In both cases, a doctor also performs the procedure, but equipment assists in the process. This artificial intelligence-enabled solution enables clinicians to conduct minimally invasive surgery using robotic arms. With short and accurate incisions, medical centers are capable of performing the most complicated and fragile procedures. It results in improved patient and hospital outcomes.

Radiology is one of the areas in medical AI that has gotten much coverage in the last few years. There are AI applications wherein it is used to improve the accuracy of medical imaging and it is also used in making surgeries precise that results in less complications. AI is also being used in creating new drugs to be presented and used in the market and because of this the risks of failed production of medicine has been reduced dramatically (Robot.net,2021)

Patients may benefit significantly from virtual nursing assistants when it comes to their daily activities. As with standard nurses, they will advise patients to take medications, make doctor appointments, and provide information about health issues. Other uses of artificial intelligence in health care include chatbots, which are computer programs that address questions online. Additionally, specific applications, such as VirtualNurse, provide patients with first aid guidance.

Artificial intelligence-enabled tools can be used in nearly any area of medicine, including drug production, clinical decisions, health care, and financial and organizational decisions. Healthcare practitioners may use AI to solve complex problems that would be difficult, time-consuming, or inefficient to solve independently. AI has the potential to be a strategic outlet for medical practitioners, enabling them to maximize their experience and contribute value to the health ecosystem.

Military



Figure 7: Uses of AI in Military

Modern militaries are divided into several sub-divisions. Like any big organization, they have communications teams, must pay their employees, and manage the paperwork in a manner comparable to companies.

Targeting systems are evaluated based on their precision and ability to lock on to a target rapidly. As countermeasures to this form of targeting gain traction, electronic targeting schemes must innovate to become less vulnerable to them. As a result, machine learning and computer vision will be the next frontiers of this scientific cat and mouse game.

Today, autonomous weapon systems identify and detect targets using computer vision. A weapon system becomes autonomous mainly because it can identify and track objects within the area it has been deployed to guard. The artificial intelligence powering the targeting will need to be focused on precisely the strategic targets worth concentrating its firepower on and alerting the platform's operator. It may be an adversary aircraft flying at high speeds into disputed airspace, a missile launched at a village, or an armored personnel carrier driving up a minor lane (Roth, M., 2021).

Currently, no autonomous weapon device is being developed capable of firing its ordinance without the explicit consent of a monitoring operator. One military advantage that autonomous weapons may have over historically manned systems is their susceptibility to human distraction

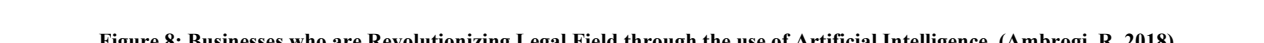
and needs. Autonomous weapons allow machine vision's ever-vigilant "eyes" to be fixed on the sky above, preventing surprise missile attacks by tracking and shooting down enemy rockets in the air until they can detonate in a populated area (Roth, M., 2021). If a human operator is overwhelmed or dozes off when written, valuable seconds can be lost.

With the quickly emerging military applications of AI, it is difficult to argue against the importance of instituting best practices and adhering to ethical standards. Machine learning developments have enabled computers to analyze and make decisions based on data at a much faster rate than the average person would. As a result, countries worldwide have been discussing the potential of providing military systems with increased autonomy. While this approach can minimize human error and mitigate soldiers' 'cognitive burden,' there are many ethical and legal issues.

Consider the scenario of a deadly autonomous weapon device. It would select, track, and engage targets autonomously, with little or no human interference, based on pre-programmed inputs. It will result in the weapons system locating targets not authorized by the military and launching accidental attacks (Walker, P). Indeed, it is debatable if Legislation will conform with humanitarian law in any meaningful way. Its algorithms' ability to discriminate between civilians and soldiers is strongly suspect. Additionally, it is unclear whether it will conduct a study of end-to-end proportionality or assess military necessity, all of which are critical doctrines governing the legal use of force.

Naturally, deadly autonomous weapon device is a more extreme example. Real, military AI has a variety of other uses, from reconnaissance to logistics. For example, it may bolster intelligence operations by analyzing large amounts of data and categorizing photographs or messages. However, the reality is that such wisdom will potentially result in devices that are uncontrollable by humans. Additionally, the data sets upon which machine learning is based could be skewed or flawed.

To minimize the negative implications of these situations, it is critical to establish international standards or ethical norms governing the implementation and application of artificial intelligence-enabled military technology. In the absence of it, there is a ticking time bomb. It is unknown if the recently formed alliance will be able to fill these voids effectively.



A direct limit of Hilbert spaces $H = \varinjlim H_n$ is called *1-finite* if $\dim H_n \leq 1$ for all n . A Hilbert space H is called *1-finite* if it is isomorphic to a direct limit of 1-finite Hilbert spaces. A Hilbert space H is called *1-finite* if it is isomorphic to a direct limit of 1-finite Hilbert spaces.

Notably, the β coefficients are significantly different from zero (at the 1% level) in all cases, indicating that the model is well specified.

In a world where the volume of data we work with has risen exponentially, AI is becoming

quicker and more reliable than humans at identifying critical information and detecting errors and anomalies.

Artificial intelligence-powered tools in law that are expressly designed to do analysis will significantly minimize the time expended on this process. As a result, the operation becomes more effective and consistent (Atkinson, K., Bench-Capon, T., & Bollegala, D.,2020). Due diligence analysis can be time-consuming. Before any significant findings are apparent, extensive testing must be conducted, often over long hours. As a consequence, individuals may make errors or provide inaccurate information. By automating the analysis, primarily due diligence, we can minimize mistakes and accelerate the process. The customer will reap the rewards of this for many years to come.

With all of the advantages and opportunities that AI offers to humanity, it is essential to consider the implications of this technology. Without a doubt, AI is revolutionizing the lives of people, but ethical implications should be considered. A synthesis of law and ethics is essential to achieve natural justice (Atkinson, K., Bench-Capon, T., & Bollegala, D.,2020).

AI is being used to aid courts in deciding the appropriate punishment for prisoners. The machine considers circumstances associated with clients with their records. The AI algorithm that produced these sentences may have flaws. Each case is unique, and even a slight bias on the part of an algorithm will result in blasphemous results.

Additionally, lawyers today make various kinds of judgments in their practice, and combining legal research, intuition, expertise, and other technical, analytical skills. AI handles certain functions previously undertaken by legal practitioners. If a hypothetical situation occurs when these devices outperform lawyers at making forecasts, significant issues will emerge. The first is an excessive reliance on AI to execute specific duties due to a change in norms, this is to avoid lawyers from making wrongful judgements (Verheij, B.,2020).

Another major problem of incorporating AI into law is the potential lack of employment in the future. And if AI is unable to replace humans entirely, it is reasonable to expect that it would result in a significant loss of workers. It could pave the way for humans to be charged with designing these AI robots, but there is still uncertainty that it will substitute for all work losses entirely.

Finally, AI is a so-called black box technology, as rather being examined or investigated, it is executed. In the field of law, both lawyer and the judge are supported with legal claims and reasoning. However, the fact that AI actions and tasks are not justified is very troubling. It could result in a phenomenon of gross inequality if it depends on incorrect machine-generated judgments about which there is no way to validate them.

Limit of Artificial Intelligence

With 90% of companies pursuing AI programs, businesses recognize the critical nature of AI for successful business processes. Spending money on AI programs will potentially reduce costs associated with time-consuming, repetitive activities that people would be required to perform. It is a financial cost and a time cost since activities such as data collection and monitoring were traditionally completed by hand. AI enables unprecedented ease of access and speed to data procedures, which is why 96 percent of companies expect artificial learning programs to continue growing in the next two years (Dialani, P.,2019).

Although AI creates some incredible opportunities across multiple markets, it also introduces a slew of new usage challenges. Previously, problems with AI execution were often attributed to employees' lack of engagement with the innovation, creating an expectation for industry experts to understand and adapt. Frequently, companies must seek outside talent to help them maximize the value of their investments. In any case, humans are not solely responsible for AI's shortcomings.

The use of data is a significant constraint on Artificial Intelligence. Any software needs data to run. It makes no sense if the program is in the preparation process or has progressed to the implementation phase; the demand for data is never satisfied. If you want to incorporate AI into a program, the process is as follows: first, the software robots must acquire specific cognitive abilities to become more sophisticated over time. Additionally, advanced computational robotics use technology such as ML, OCR, NLP, and RPA to decipher the meaning of data that is restricted in papers. From that stage on, distinct functions often become the most vital component, such as automating critical reasoning or decision-making tasks (Dialani, P.,2019).

Individuals are creatures of habit; as we find a method for performing a mission that seems to be viable and successful, we seem to stick with it. It often takes some influence to see that the disruption and expense associated with modifying methodologies or implementing new methods

are worth the overall benefits. It may be as simple as an inability to cede authority, whether to computers or to the human workers who oversee the technical system that enables AI.

Individuals and data both exhibit concealed bias, and data sometimes succumb to bias in light of people. Obligations cannot be fulfilled without details. Data collection can be done, and there will be a bias that the collector of data is not aware of. One model comes from the world of self-driving vehicles.

Though AI continues to improve in sophistication, we have reached a stage where computing capacity or speed is no longer a constraint. It's a perfect time to focus on AI's relational intelligence to interact more naturally with humans. NLP should be sufficiently accurate to grasp what a person is attempting to communicate and its emotions. In most short words, the AI can understand the meaning of the conversation.

The problem is that AI is emotionally immature since it is incapable of classifying individual emotions and mindsets into unique data points or profiles. In any case, things will begin to improve within the next few years.

It is an amalgamation of a few different obstacles – a lack of expertise, a lack of management buy-in, and an insufficiently saturated society with the interests and practicalities of AI and digital transformation (Dialani, P.,2019). The result is often AI operations that are not strategically organized, do not meet strategic business priorities, and do not work into a company's overall development and business development behavior.

Frequently, the reason for this is that, while organizations are well aware of the importance of adopting AI innovation and the benefits it can provide, they fail to approach it strategically; this requires an in-depth understanding AI operation. The response is straightforward; businesses should always ensure that a specific policy is in place before investing time and money in expensive and resource-intensive AI projects and pilots with no fair understanding of the benefits they may offer (Milićević, P.,2020).

Conceptual Problem

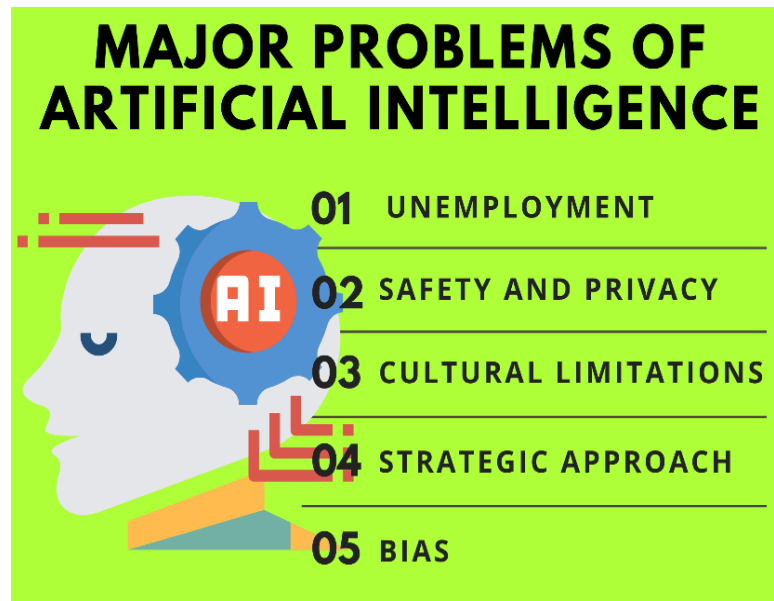


Figure 9: AI Problems

Unemployment

Concerns over job reduction due to AI have been the topic of various business cases and research studies. According to an Oxford report, by the mid-2030s, technology would threaten over 47% of American jobs. According to the World Economic Forum, artificial intelligence will automate over 75 million jobs by 2022 (Frey, C. B. & Osborne, M. A., 2013). . Specific numbers are far more intimidating. AI-based robotics could eventually replace 30% of the world's existing workforce (McKinsey & Company, 2018). According to Kai-Fu Lee, an AI specialist and venture capitalist, 40% of global employees will be filled by AI-based bots over the next 10-15 years (Li, K., & Vossenkuhl, J., 2018). This reform would disproportionately affect low-income and low-skilled staff. As AI gets more innovative daily, even high-paid, high-skilled jobs become more vulnerable to job cuts as firms gain higher margins by automating their work.

Safety and Privacy

There has always been considerable controversy surrounding the safety implications of Artificial Intelligence. There are circumstances that AI malfunctioned in several social media platforms such as Twitter and Facebook. Due to these malfunctions, the AI had created irreversible damages and avoided it from happening again, and the project has been shut down.

There are grave fears that Artificial Intelligence would do something detrimental to humanity. Consider autonomous weapons that can be programmed to murder other humans. Additionally, there are impending questions about AI having their minds and disregarding human existence. If such weapons are used, it would not be easy to reverse their effects.

As Artificial Intelligence algorithms become more influential daily, they introduce several trust issues regarding their ability to make fair and beneficial decisions to humanity. With AI gradually approaching human-level cognitive skills, the issue of trust becomes even more critical. There are several applications in which AI operates in a black-box fashion. For instance, in High-Frequency Trading, even the programmers lack a thorough understanding of the underlying logic by which the AI executed the trade.

Cultural Limitations

In a nutshell, this is a discussion on opposition to transition. Individuals, as previously said, are creatures of habit; as we find a method for performing a mission that seems to be viable and successful, we seem to stick with it. It frequently takes some influence to see that the disruption and cost associated with changing methodologies or implementing new procedures are worth the overall benefits. It could be as simple as a reluctance to cede control, whether to machines or to the human employees who manage the technological framework that enables AI.

Strategic Approach

It is an amalgamation of a few different barriers – a lack of talent, a lack of management buy-in, and an insufficiently saturated culture. AI activities are executed and not planned thus using AI in creating goals and development is not yet sufficient. Frequently, the reason for this is that, while organizations are fully aware of the importance of adopting AI innovation and the benefits it can provide, they fail to approach it strategically. The answer is straightforward; businesses should

always ensure that a detailed procedure is in place before investing time and money in costly and resource-intensive AI initiatives and pilots with no reasonable understanding of the benefits they may bring.

Bias

Individuals and data both exhibit concealed bias, and data sometimes succumb to bias in light of people. We cannot fulfill these obligations without details. At that moment, you go out to collect data, and the data can contain a bias that people are unaware of. One model comes from the world of self-driving vehicles. People see more detail in affluent areas since that's where automated cars will first arrive.

An AI machine is just as strong as the data it receives as feedback. If you can purify the training data of conscious and implicit stereotypes about race, gender, and other ideological ideas, you can create an AI system that makes impartial data-driven decisions.

AI is not expected to ever be entirely impartial, for the same reason as mentioned previously. AI is just as strong as the data it is fed, and humans are the ones that generate data. There are many individual biases, and the continuing discovery of new biases is continuously increasing the overall number. As a result, just as it is not conceivable to have an entirely impartial human mind, neither is it possible to have an altogether unbiased AI system. After all, humans generate biased data, and humans and human-created algorithms search the data for prejudices and delete them.

RESULTS

4.1 Impact of Artificial Intelligence

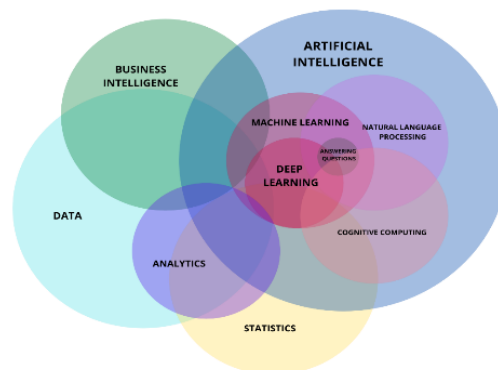


Diagram 5: Relationship between Artificial Intelligence

Artificial Intelligence and Machine Learning have become synonymous with information technology technologies in the twenty-first century. However, not knowing these words and conflating them can act as a hindrance to mastering these concepts. Machine learning is a subset of artificial intelligence – consider it a subset of artificial intelligence. Artificial intelligence is a broader term that refers to the process of developing algorithms that think like humans. The learning component of these algorithms can be encoded by the person who also encodes the rationale that the algorithm may obey.

Machine learning is a subset of artificial intelligence in which the learning component of the AI is not directly encoded (Fadziso, T., 2018). Rather than that, the human instructs the AI about learning from data and drawing inferences or "predictions" based on new data. As a result, the computer "learns" on its own using historical evidence.

AI is a collection of tasks that computers are capable of doing. For complex tasks, machines learn these tasks using artificial learning and deep learning. These methods work in tandem to turn data into observations in data science. Given that companies typically benefit from unique perspectives, it is reasonable to expect that we will continue to see an increase in the use of these autonomous computer processes in the future.

Machine learning and the different methods used to do it share many traits at the heart of specific ethical concerns. Two of these traits seem to pose the most legal problems: many modern machine-learning methods are ambiguous, which means that even professionals equipped with the appropriate equipment cannot know whether and how inputs are turned into outputs, for example, how precisely a personal profile results in a rating for a mortgage application or parole decision. Second, these systems require extensive data sets for testing and evaluation (Fadziso, T., 2018).

Pros and Cons



PROS	CONS
<ul style="list-style-type: none">• Artificial intelligence completes routine tasks with ease.• Artificial intelligence can work indefinitely.• Less Errors• Can be used by anyone• Productivity• Extends Human Experience• Available 24/7• Performs Repetitive Taks	<ul style="list-style-type: none">• Expensive• Unemployment• Own Decision• No Creativity• Lacks Improvement• Inaccurate• Can't Replace Human Judgement• No Sympathy• Risk of Losing Data• Exploitation

Figure 9: AI Pros and Cons

The public is interested in learning how it can disrupt their market and reinvent their businesses. However, the media has occasionally painted an unrealistic image of AI's capabilities in recent years. Artificial intelligence is now disrupting online browsing, advertisement, banking, logistics, and media, among other industries. Though AI can change a wide variety of sectors, this transformation will not occur immediately. Surprisingly, considering the breadth of AI's influence, its applications remain minimal. Almost all of AI's recent success has been made via a single type, in which certain input data is used to produce a simple answer quickly.

The ability to input data and produce production can change many industries. Supervised learning is the scientific term for developing this program. This program is a long way from the sentient robots promised by science fiction. Additionally, human intelligence does far more than process inputs. These systems have advanced exponentially in recent years, and the strongest are now developed using a technique called deep learning or deep neural networks, which was partially influenced by the brain. However, these devices are very far from science fiction. Numerous researchers are investigating alternative models of artificial intelligence, some of which have

shown promise in regional contexts; there could well be a development that enables higher levels of intelligence to be achieved, but there is currently no concrete road to this target.

The Achilles' heel of today's supervised learning software is that it needs a massive amount of data. Users must demonstrate several samples of inputs and outputs to the machine. If an average human can perform a mental task in less than a second of thought, it will likely be automated using artificial intelligence either now or soon.

AI needs a careful selection of inputs and provision of appropriate data to assist the AI in determining the relationship between the data provided. Making strategic choices has now revolutionized several businesses. It is on the verge of revolutionizing even more.

Once executives have a firm grasp of what AI can and cannot achieve, the next move is to incorporate it into their strategies. It requires an appreciation of how meaning is generated and what is challenging to replicate. The artificial intelligence ecosystem is unusually accessible, with most leading researchers posting and exchanging ideas and even open-source code.

SWOT Analysis

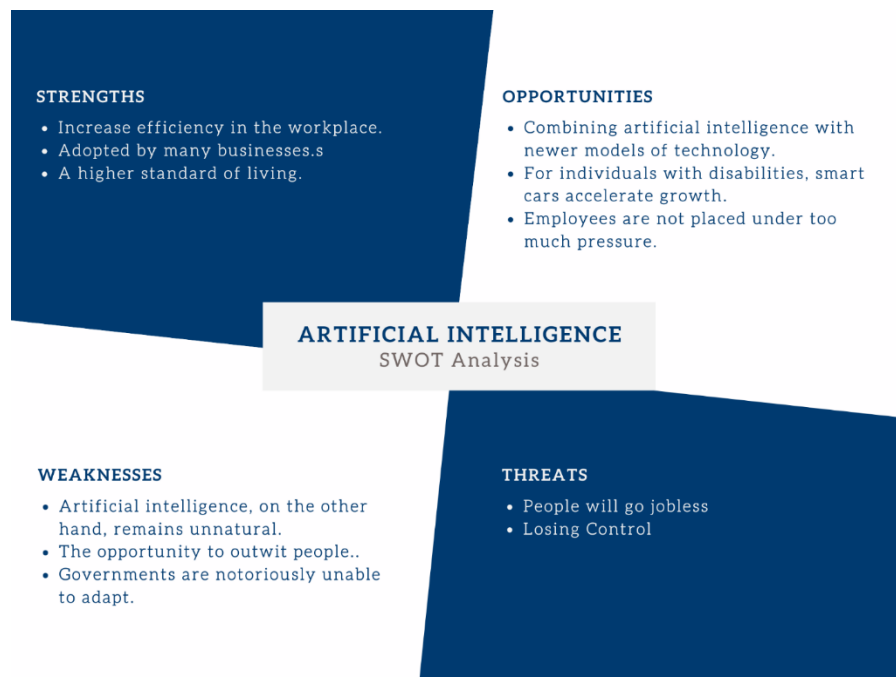


Figure 10: AI SWOT Analysis

Strengths

Increase efficiency in the workplace.

Instead of wasting hours of the workforce on repetitive, menial jobs, workers can program artificial intelligence to perform them. While we have previously used computers on manufacturing lines, AI enables them to serve many activities more effectively than ever before.

It is advantageous for both businesses. Businesses save resources by using computers to perform routine operations (rather than humans). It reduces operational costs and even fines for noncompliance.

Adopted by many businesses.

AI is being used in different industries. AI is being used to filter data, and it is also being used in facial recognition and academic science. There are so many systems that are now powered by AI and these system gives advantage to different industries.

A higher standard of living.

Artificial intelligence is also found outside of the office. Individuals who own smart speakers and light bulbs are now using AI in their homes. These systems simplify home management and will help you save money on your power bill. You can also find AI in your vehicle if you purchase a reputable brand such as Tesla.

It's strange in some aspects. A few years earlier, artificial intelligence was confined to science fiction novels, video games, and films. It has become ubiquitous, even though it has not yet reached its maximum potential.

Weaknesses

Artificial intelligence, on the other hand, remains unnatural.

As you are probably aware, artificial intelligence is a form of technology. It may be a robot or an algorithm. However, it is not human. And this final point remains both a positive and a drawback. As a strength, this ensures that people who work in occupations that need a touch of "humanity" will feel secure, knowing that their jobs are not yet up for grabs by the technical overlords.

However, as a limitation, this implies that AI is constrained. It is a method, but not always a remedy. AI is capable of communication but not of emotional communication. As a result, although it can process information, it will be incapable of comprehending or reacting to the nuances of human emotion.

The opportunity to outwit people.

Developers are constantly expanding the boundaries of artificial intelligence. At the moment, it is capable of completing a mission, learning, and remembering knowledge. However, maybe in the future, it can reach a point where it will improve and reinvent itself without human intervention.

Governments are notoriously unable to adapt.

Legislation, rules, and legislation are falling behind the exponential advancement in technology. Also, Congress does not grasp how the internet functions in its entirety, so what chance is there for legal AI use?

Opportunities

Combining artificial intelligence with newer models of technology.

Artificial intelligence is inextricably linked to other emerging technologies such as artificial learning, deep learning, and the Internet of Things (IoT). It's likely to be integrated into code, allowing developers to address problems in reverse. It enables more effective problem-solving, which can help other sectors, such as customer service.

For individuals with disabilities, smart cars accelerate growth.

At the moment, we see the introduction of AI in the car industry. Tesla automobiles use it to self-drive on highways and park themselves without human help. It is something straight out of a science fiction book, but it's helpful for people who have injuries that affect their ability to drive.

Employees are not placed under too much pressure.

It enables us to automate mundane tasks. It is ideal for individuals who despise specific roles and instead concentrate on the "big picture." Entrepreneurs and startups of workers who wear many hats and are overworked would adore AI for this.

Threats

People will go jobless.

The general public believes that the implementation of artificial intelligence would result in work losses. Consider the self-checkout lanes. Several of them and only one or two workers move in when a customer encounters a problem.

For businesses, a world without human cashiers is a realistic option. one example of AI automating routine human activities while still eliminating work openings. To address this, the labor market must evolve. Rather than being supplanted by AI, humans would need to coexist with it. If this is a sustainable future remains an open question.

Losing Control

People wonder whether AI can become so intellectual that humans will lose control. It may seem to be a distant fear, but it may be closer than you believe.

4.4 Visual of Conceptual Problem Solution

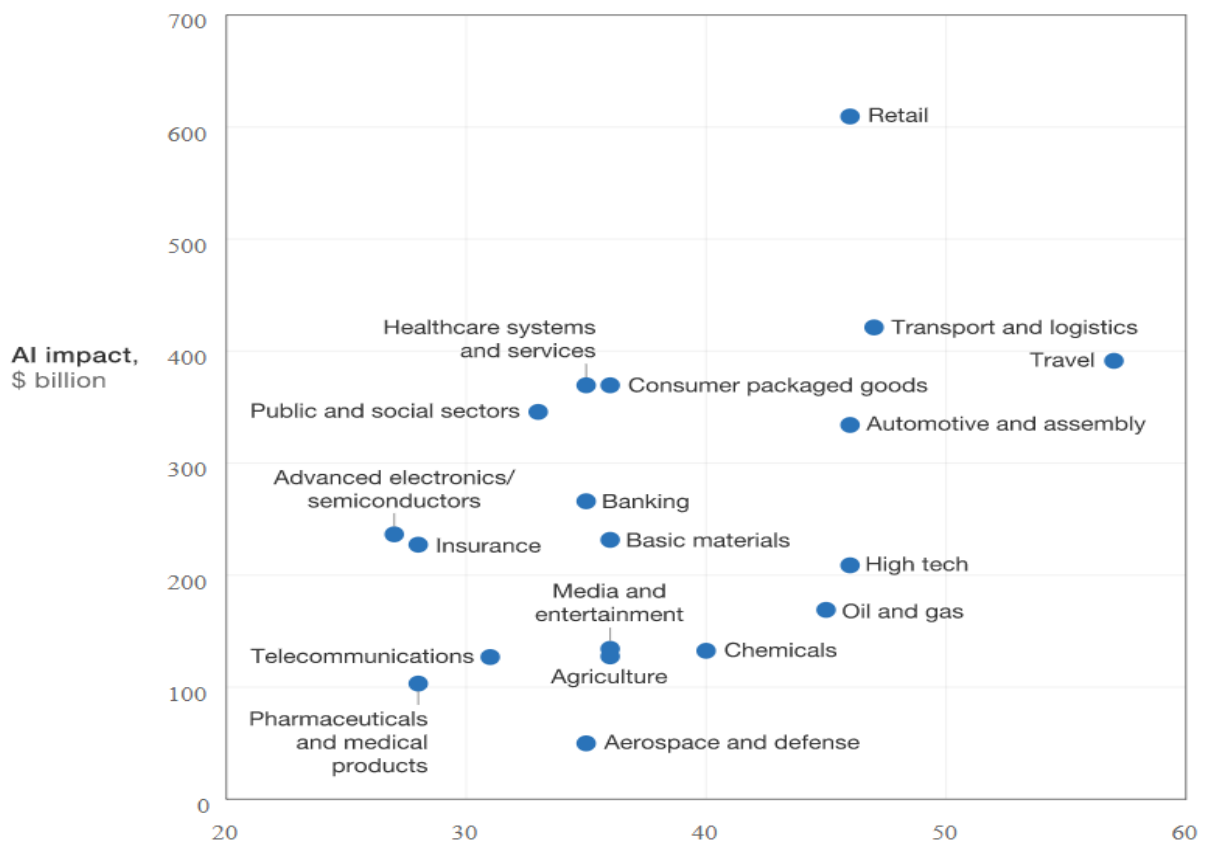


Diagram 5: Share of AI Impact in Total Impact Derived from Analytics (McKinsey Global Institute Analysis)

There are numerous limitations of AI, but there are undoubtedly more benefits that people are now recognizing. As seen in the diagram above, many sectors are benefiting from the increased use of technology. Artificial intelligence has started to provide tangible benefits to companies across a range of sectors. It will become more evident as AI technologies become more available and easier to incorporate in the future. Despite widespread interest in using AI and machine learning technologies, adoption and rollout in many enterprises remain poor. Most of this is because companies fail to factor in such realities about AI programs.

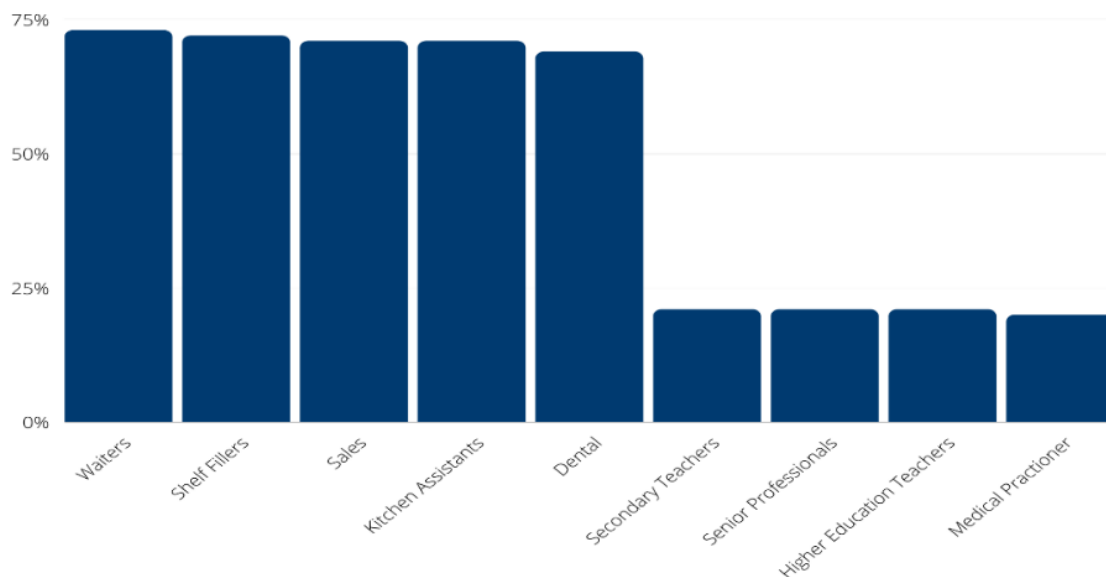


Diagram 6: Job at Risk From Automation (Office for National Statistics)

It is hard to recreate Critical Thinking and Innovation, and by focusing on these aspects, jobs will not be taken over by Artificial Intelligence. Growing public and private spending in human resource development ensure that it is more closely matched with market demand. Improving the job market's situation by closing the demand-supply gap and fostering the gig economy will secure the jobs of employees.

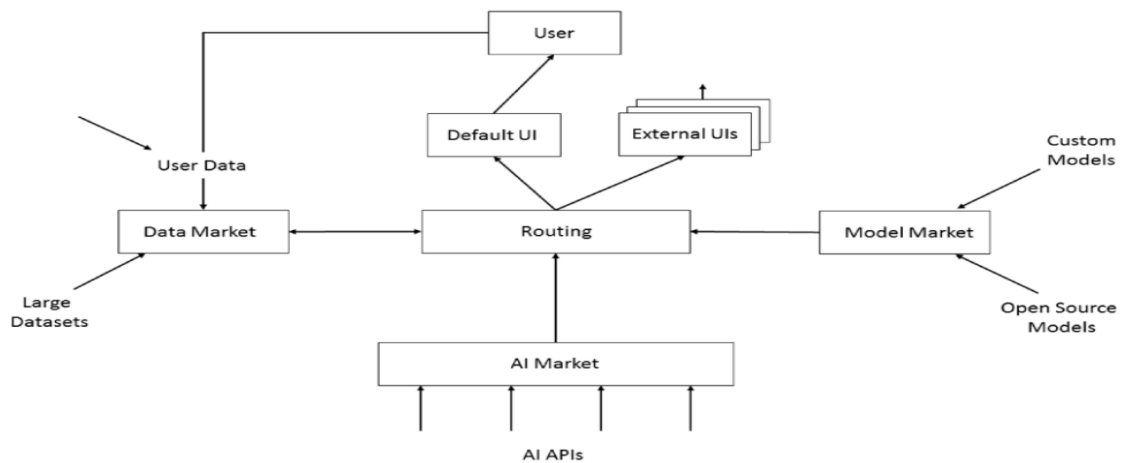


Diagram 7: AI Safety Problems (Surtees, A., 2020)

The major providers of artificial intelligence must guide rules and standards relating to confidence and openness in AI applications. These standards must be adhered to faithfully by all players interested in creating and using artificial intelligence. Both stakeholders should be mindful of the latent bias in AI algorithms and provide a rigorous framework for detecting and resolving bias. Another critical element in bridging the confidence divide is awareness. Users should be educated about the activities of artificial intelligence, its advantages, and also its shortcomings.



Figure 11: Strategic Approach Solution

The first step in developing an effective AI and machine learning approach identifies the appropriate challenges to solve and areas to turn. Although the possibilities will seem limitless, it is critical to begin in the correct position, as this will serve as the basis for incremental benefit from subsequent AI interventions.

On the other hand, it defies logic to provide an AI solution that cannot be expanded or scaled in the future. Simultaneously, it is vital to bear in mind the rule of diminishing returns and avoid losing the strategic edge that an organization can achieve with an aggressive AI approach that can be applied earlier rather than later.

The majority of data-intensive and process-intensive business functions are ideal for AI interference. Businesses today have an abundance of data; in practice, most of the time, the problem is making sense of the massive volumes of data – Big Data – that they possess. Any of the data they contain may be unusable or biased, whereas others may be obsolete. Additionally, businesses will not always be looking at the appropriate data sources or considering potential size when it comes to data reach and accuracy.

Although most businesses agree that AI can be beneficial, they often fail to integrate it into their current processes and enterprise infrastructure. Utilizing out-of-the-box artificial intelligence products and solutions can also become complicated as they cannot be combined into current programs without requiring a complete redesign and affecting other procedures.

Without the right AI approach, the challenge of seeking a cost/benefit trade-off, and the pressure to demonstrate rapid ROI, AI systems often fail to take off or achieve enterprise-level penetration within businesses. AI systems do better when used in conjunction with a results-driven product strategy, which usually has a faster response time than other types of projects. As a result, successful AI techniques look to solve the management of transition and acceptance.

Considerations for security and enforcement should be incorporated from the outset of every AI plan. Otherwise, businesses may attempt to retrofit these steps into an existing solution or reinvent the wheel to arrive at a remedy that works – both of which would be expensive and unsuccessful.

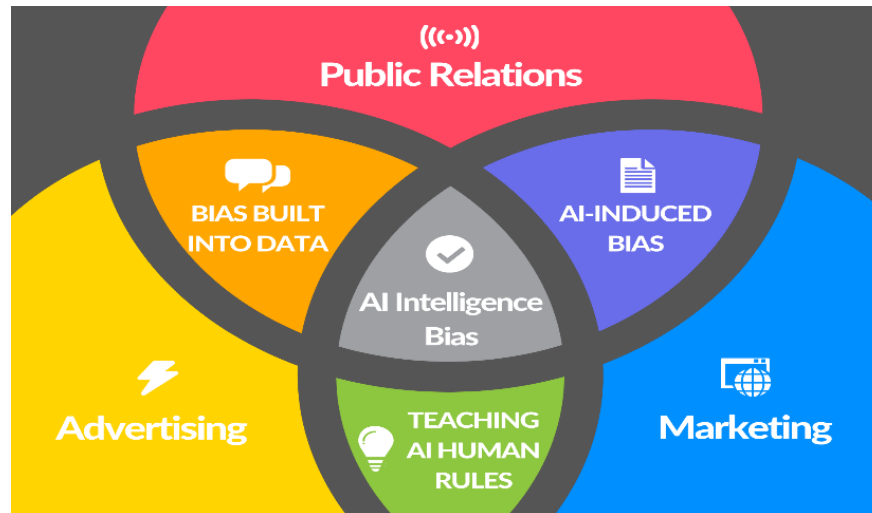


Figure 12: Bias in Artificial Intelligence

The first step toward regulating these mathematical models must begin with the modelers themselves. Designers should avoid excessively complicated mathematical tools that obscure the models' simplicity and explainability when developing these models. They should closely examine the data used to build these models to prevent the use of unsafe proxies.

Additionally, they should still remember the model's end goal: simplifying people's lives, adding benefit to the world, and enhancing our overall quality of life, whether by industry or academia, rather than relying on Machine Learning metrics such as precision or mean squared error. Additionally, if the models are being developed for a particular enterprise, another standard measure of performance would almost certainly have to be added to the second plane: economic benefit.

As we move toward a more data-driven environment, policymakers will be required to step in to provide a realistic and open regulatory framework for the use of AI models in such sectors as banking, insurance, pharmacy, and education. Both of these are critical components of an individual's life and should be handled with extreme caution.

As practitioners of artificial intelligence, those responsible for developing the technologies should re-examine their data collection and usage practices. Recent initiatives provide criteria for reporting models and datasets to eliminate negative prejudices before their establishment, using the previously listed Model Cards and a related framework for datasets.

Apart from that, we should strive to develop non-black-box, explainable models, rigorously audit them, and closely observe their outcomes, taking the time to analyze some of the results manually.

Finally, we should educate the broader population and general public on how data is used, what it may be used for, and how it can influence them and inform them transparently while an AI model is analyzing them.

DISCUSSION

Interpretation of Results

Artificial intelligence has now been ingrained in the fabric of daily life. From an internet search engine to email spam and malware filtering to detecting fraudulent credit card payments, AI satisfies an individual's market, entertainment, and technological needs. There is potential for routine implementation; machine learning and deep learning have shown success in various fields. There are three types of learning. Unsupervised learning is used to uncover secret patterns in data. Supervised learning is used for inference (classification or regression). Reinforcement learning is another method of learning in which an algorithm determines the optimal course of action based on its consequences.

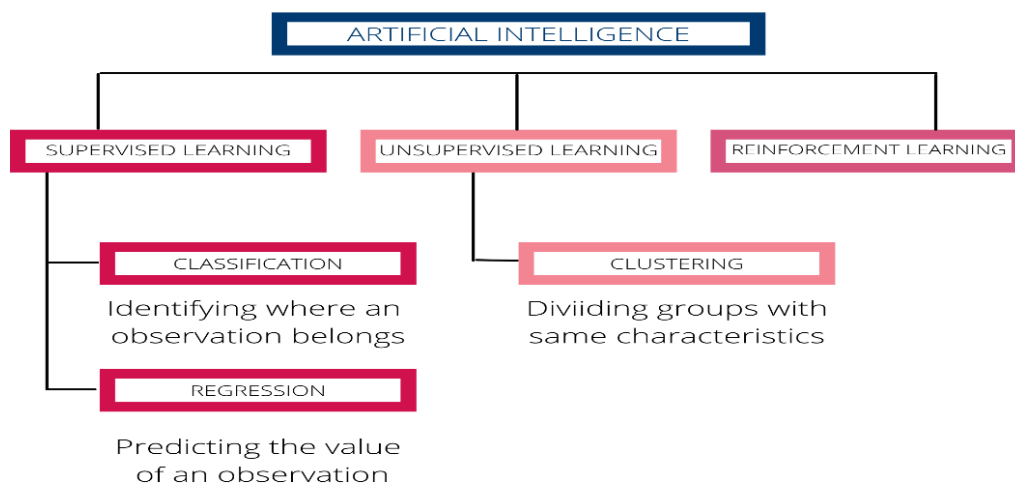


Figure 13: Artificial Intelligence in Machine Learning

Artificial intelligence is now upending markets. However, industry and IT leaders often have a narrow perception of AI. They rely almost entirely on ML. However, AI innovations are critical enablers of dynamic structures.

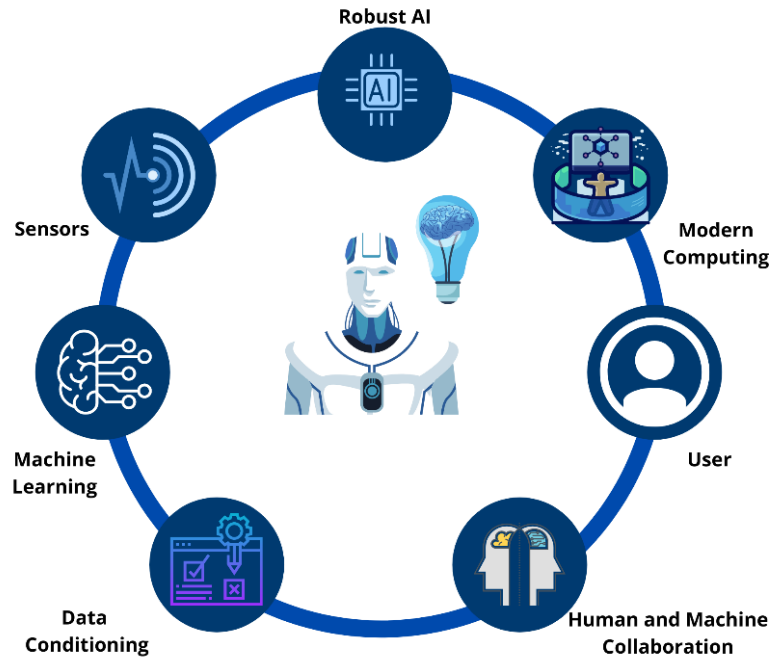


Figure 14: Artificial Intelligence System Architecture

Sensors: There is also positive and bad news about data processing, and both are identical: There is a recent report that around 90 percent of data in the world had been collected and approximately 80 percent of those are unstructured data, which does not scale well when processed in traditional relational databases (Martinez D.,2020). Much of this latest data offers tremendous opportunities in artificial intelligence, but it still poses significant challenges.

Data Conditioning: With such a wealth of data at their disposal, data scientists must develop novel methods to process data while removing all interruptions for the algorithms to work. There are methods wherein raw data are translated into information, this is needed. The resulting data information is then fed into a machine learning sub-component for knowledge extraction.

Human and Machine Collaboration. Machine learning tools are often confused with AI in their entirety. However, taking a step back, it's clear to see that machine learning is just one link in a series. Also, after extracting the knowledge, it requires collaboration between humans and machines. For instance, a machine learning algorithm can identify potentially cancerous cells from some machines used in the hospitals. However, it will be up to individual physicians to verify the machine learning tool's evaluation accuracy and perform further checks. The human-machine collaboration allows the extraction of information and perspective.

Machine Learning: After passing structured and unstructured data to machine learning tools, specialists may begin experimenting with various strategies for extracting information from the conditioned data. Several classes of machine learning methods, including unsupervised learning, which does not need labeled data; guided learning, which does require labeled data; and reinforcement learning, which is ideally suited to situations in which expectations and behavior can be identified without actually requiring labeled data.

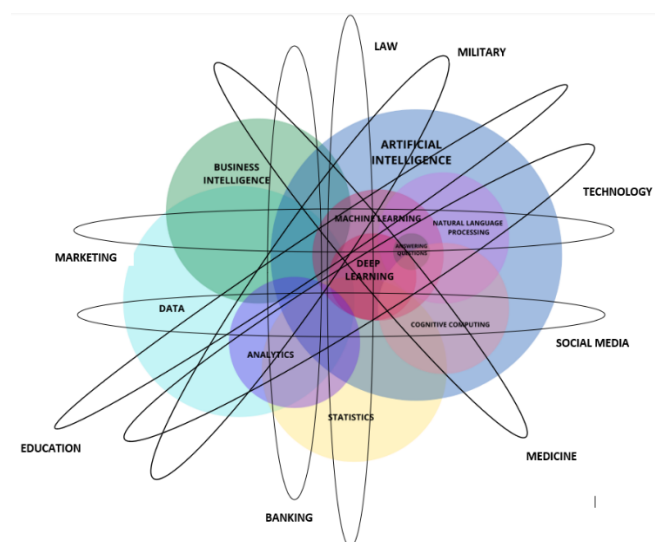
Users: It is the stage at which consumers ingest the generated insights to determine the appropriate course of action.

Modern Computation: Variety of contemporary computational technology is used in this process wherein the complexity of data and algorithm is determined

Robust AI: Companies make sure that all algorithms are up-to-date and explainable in order to remain reliable and secure.

Additionally, there must be a critical examination about the bias of AI. Aside from that, there must be implementations on training and security to maintain the fair sure of AI and to avoid competitors from gaining control of all the AI techniques a company is using. There are significant and influential usage cases that increase user efficiency and decision-making capacity. However, AI can grow over time to provide more collaborative implementations, with many human-machine teams collaborating.

VENN Diagram



Interpretation of Results

Artificial intelligence has arisen as a potentially transformative technology in different fields. The widespread use of big data and artificial intelligence would undoubtedly alter the foundations of several industries. Although traditional statistics remain extremely useful when dealing with small data sets and determining causal relationships, many fields and studies will be dominated by efficient analysis and discovery of big data using AI.

Though sectors such as financial institutions and law benefit from machine learning, both face limitations in with NLP and both industries have used natural language processing before in generating a human answer, but this is highly confined to the algorithm embedded in their programs. If a customer has a different problem, computers may be unable to respond unless the concern is included in their database. Though machines will respond, the concern might not be appropriately answered.

AI will contribute more to mobile wellbeing, statistical modeling, and synthetic data creation, with current regulations addressing its legal and ethical implications. A thorough understanding of human physiology and emotional processes is critical for interpreting AI findings in this paradigm shift. Meanwhile, AI literacy would become vital for comprehending cutting-edge technologies, but this is a significant constraint on AI at the moment.

Lack of expertise and management buy-in, and an insufficiently saturated society with the interests and practicalities of AI and digital transformation. The result is often AI operations that are not strategically organized, do not meet strategic business priorities, and do not work into a company's overall development and business development behavior.

Frequently, the reason for this is that, while organizations are well aware of the importance of adopting AI innovation and the benefits it can provide, they fail to approach it strategically; this requires an in-depth understanding of all aspects of AI operations, from data collection to how the revealed experiences are imparted to the workforce. The response is straightforward; businesses should always ensure that a specific policy is in place before investing time and money in expensive and resource-intensive AI projects and pilots with no fair understanding of the benefits they may offer.

Although AI has made significant strides, it nevertheless falls short of capturing all of the features humans possess. For instance, technology lacks background knowledge and skills in different fields. Due to these drawbacks, humans can serve as the AI's trainer and quality management mechanism during analysis.

It's essential to keep in mind that artificial intelligence is a platform for automating the electronic discovery process. AI without a person as a guide is significantly less practical at accomplishing a particular target. Without the correct mix of technologies and humans, it will take longer, be more labor-intensive, and yield lower-quality outcomes overall. With this in mind, the most efficient method of generating appropriate evidence for any legal event is through a hybrid approach of human and machine collaboration.

CONCLUSION

Artificial intelligence is a well-understood concept today. It is used to simulate human capacities such as communicating, listening, understanding, and preparing by processing data and producing effects based on its input. Artificial intelligence has been used in a variety of fields for data mining and decision making. Artificial Intelligence was created to aid in decision- and solution-making processes by using a problem-solving approach. The advancement of Artificial Intelligence technologies improves performance and accelerates various types of workflows, enabling businesses to maximize profits while reducing waste and expenses associated with low productivity.

Indeed, Artificial Intelligence is progressing at a breakneck pace, and many companies are eager to experiment with and evaluate what is possible on the market. On the other hand, others are skeptical of Artificial Intelligence due to perceived legal concerns that could result in transparency in a specific way. This study would explore how Artificial Intelligence is used in various areas such as law, medicine, the military, and the shortcomings that exist.

It seems to be that AI today's most significant concern is a threat to be a loss of jobs, particularly in sectors like manufacturing and agriculture. AI-enabled employees have some advantages over human coworkers. Since they lack mental and personal reactions, they are never fatigued. The chances of mistakes are significantly reduced. Since AI offers incredible prospects in different markets, it too brings new hurdles. Before this, issues with AI implementation were widely attributed to employees' lack of interest or involvement in the process. on an ongoing basis.

AI adoption often occurs when companies recognize the value of implementing it but neglect to consider the procedures and policies that form it; this involves thorough comprehension of all parts of AI operations, from data collection to conveyance of exposed interactions. The response is self-evident—always has a long-term business plan before embarking on costly and resource-intensive AI initiatives.

Security and compliance considerations should be included in any AI design. Otherwise, companies can attempt to reverse-engineer the solution or start from scratch to arrive at a solution that would be both costly and ineffective artificial intelligence bias. Artificial intelligence experts who create the technology should analyze their data collection and use earlier programs established

guidelines for reporting models that datasets and provide for eliminating biases before new models are built. AI is now ubiquitous. AI has fulfilled various personal, entertainment, and technical needs on the internet since the launch of Google in 1997. Machine learning and deep learning have demonstrated broad-reaching benefits in other areas.

There are various disadvantages to AI, but clearly, more advantages have been discovered. Technology is benefitting several different industries. AI has also begun to assist real-world businesses through several sectors. Many and more straightforward artificial intelligence applications will appear in the future. Adoption and rollout of many companies remain low in the general corporate sector. Mostly, this is because businesses disregard the realities of AI systems.